

## **REMARKS**<sup>1</sup>

In the final Office Action mailed May 8, 2006 ("Office Action"), the Examiner objected to the Information Disclosure Statement filed May 1, 2002; rejected claims 14-20, 24-27, and 29 under 35 U.S.C. § 112, second paragraph; rejected claim 14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,619,680 to Nourshargh et al. ("Nourshargh"); rejected claims 15-17, 24-26 and 29 under 35 U.S.C. § 103(a) as being unpatentable over the combination of U.S. Patent No. 6,605,228 to Kawaguchi et al. ("Kawaguchi"), U.S. Patent No. 3,850,604 to Klein ("Klein"), Nourshargh and U.S. Patent No. 6,356,694 to Weber ("Weber"); rejected claims 18-20 under 35 U.S.C. § 103(a) as being unpatentable over Kawaguchi in view of Klein and U.S. Patent No. 4,915,810 to Kestigian ("Kestigian"); and rejected claim 27 under 35 U.S.C. § 103(a) as being unpatentable over Kawaguchi in view of Klein, Nourshargh, and U.S. Patent No. 6,615,614 to Makikawa ("Makikawa").

By this amendment, Applicants have amended claims 14, 18, and 29. Claims 14-29 remain pending in this application, of which claims 14-20, 24-27 and 29 are presented for examination.

### **I. Objection to the Information Disclosure Statement**

Regarding the objection to the Information Disclosure Statement (IDS) filed May 1, 2002, the Examiner asserts that the lists (Form PTO/SB/08 documents) fail to indicate the dates of publication of the non-patent documents cited thereon. Applicants cannot find a May 1, 2002, IDS and therefore are unable to respond to the objection. Applicants request that the Examiner either identify the date of the IDS being objected to or remove the objection.

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<sup>1</sup> The Office Action contains a number of statements reflecting characterizations of the related art and the claims. Regardless of whether any such statement is identified herein, Applicants decline to automatically subscribe to any statement of characterization in the Office Action.

**II. Rejection under 35 U.S.C. § 112, second paragraph**

Regarding the rejection of claims 14-20, 24-27, and 29 under 35 U.S.C. § 112, second paragraph, the Examiner first asserts with respect to elements recited in claims 14, 18, and 29, the Examiner further asserts that “[i]t is not understood what is meant by a separate step of etching the core layer,” and “[t]he specification fails to indicate what the step is ‘separate’ from.” Office Action, page 4. Applicants disagree with the Examiner’s assertions. In an attempt to expedite prosecution, however, Applicants have amended claims 14, 18, and 29 adding “simultaneously depositing and etching a core layer,” and deleted “separate step of etching the core layer.” Support for this amendment may be found in Applicants’ specification at, for example, paragraph [0008], lines 1-2; paragraph [0014], lines 1-2; paragraph [0024], lines 3-4; and paragraph [0035], line 1.

In addition, the Examiner has also asserted that “[t]he meaning of ‘cover’ is not understood ... it is unclear if ‘cover’ requires 100% coverage.” Office Action, pages 3-4. Although Applicants do not agree with the Examiner’s assertion, Applicants have amended claims 14, 18, and 29 in an attempt to expedite prosecution. Specifically, Applicants have amended claims 14, 18, and 29 to recite a combination wherein “the core layer continuously covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure.” Support for this amendment may be found in Applicants’ specification at, for example, paragraph [0038], and Figures 2, 4A, and 4B.

Moreover, the Examiner further rejects claims 14-20, 24-27 and 29 under 35 U.S.C. § 112, second paragraph, asserting that the claims “fail[] to set forth the subject matter which applicant(s) regard as their invention. Specifically, the Examiner asserts that “[e]vidence ... can be found in the reply,” wherein “applicant has stated ‘the core layer is not etched’, and this statement indicates that the invention is different from what is defined in the claim(s) because the

claims merely require the absence of a separate step of etching and [0035] - [0036] discloses that etching does occur.” Office Action, page 4. Applicants respectfully submit that the referenced statement contained a typographical error, and should have read “the core layer is not separately etched,” consistent with independent claims 14, 18, and 29, which now recite a combination including “simultaneously depositing and etching a core layer.” Accordingly, Applicants respectfully submit that the subject matter regarded as Applicants’ invention is clearly set forth in the claims.

For at least the foregoing reasons, Applicants respectfully request that the Examiner withdraw the rejections of claims 14-20, 24-27 and 29 under 35 U.S.C. § 112, second paragraph.

### **III. Rejections under 35 U.S.C. § 103(a)**

Regarding the rejection of claims 14-20, 24-27 and 29 under 35 U.S.C. § 103(a), Applicants respectfully disagree with the Examiner’s arguments and conclusions as set forth in the outstanding Office Action. Accordingly, Applicants respectfully traverse this rejection.

To establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a), each of three requirements must be met. First, the reference or references, taken alone or combined, must teach or suggest each and every element recited in the claims. *See* MPEP § 2143.03 8th Ed. (Rev. 4), October, 2005. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the references in a manner resulting in the claimed invention. Third, a reasonable expectation of success must exist. Moreover, each of the three requirements must “be found in the prior art, and not be based on applicant’s disclosure.” *See* MPEP § 2143 8th Ed. (Rev. 4), October, 2005. A *prima facie* case of obviousness has not been established because, at a minimum, the references fail to teach or suggest every element recited in the claims.

#### **A. Nourshargh**

Nourshargh fails to teach or suggest a combination including at least “the core layer continuously covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure,” as recited in amended claim 14 (emphasis added). Nourshargh teaches:

the desired waveguide pattern is first written on a substrate 11 using photolithography ... core glass 14 is deposited on the substrate ... and by suitably controlling the amount of dopant in the core glass as the dopant in the core glass as the deposition process is carried out, it may have any desired refractive-index profile across its thickness *which is less than the depth of the grooves 13* so that the waveguide is fully embedded within the grooves 13. Nourshargh, col. 2, lines 7-28 (emphasis added).

As further shown in Fig. 2(c), since the thickness of the core glass 14 is less than the depth of the grooves 13, core glass 14 does not “*continuously* cover[] the ridge portion, *the sidewall portion, and* the planar portion of the ridge structure,” as recited in claim 14 (emphasis added). Moreover, the Examiner acknowledges this deficiency of Nourshargh, stating “something that can be *discontinuously* covered ... as what is shown in Nourshargh.” Office Action, page 4 (emphasis added).

Nourshargh also fails to teach or suggest a combination including at least “simultaneously depositing and etching a core layer,” as recited in amended claim 14.

Nourshargh teaches

[t]he required waveguide pattern is then written photolithographically on the deposited core layer and this pattern is suitably masked 12 (FIG. 3(b)). The rest of the core layer is completely *etched away*. Nourshargh, col. 2, lines 37-41 (emphasis added).

Nourshargh thus teaches separate, not simultaneous, deposition and etching processes.

Accordingly, Nourshargh fails to teach suggest a combination including “simultaneously depositing and etching a core layer,” as recited in claim 14.

In the Office Action, however, the Examiner asserts that Nourshargh's teaching of etching "is largely irrelevant as that teaching pertains to a different embodiment." Final Office Action, page 8. Applicants remind the Examiner, however, "[a] reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art." MPEP § 2123, 8th Ed. (Rev. 4), October, 2005. In any event, Nourshargh teaches, with respect to the embodiment *applied by the Examiner*, "[i]n a preferred embodiment ... [t]he desired pattern of glass may be formed by selective removal ... and then etching away the remainder of the first layer of glass." Nourshargh, col. 1, lines 33-43 (emphasis added). Accordingly, for at least this reason, and the reasons discussed above, Nourshargh clearly fails to teach or suggest a combination including "simultaneously depositing and etching a core layer," as recited in claim 14.

B. Kawaguchi in view of Klein, Nourshargh, and Weber

Claims 15-17 and 24-26 depend from claim 14, and thus require all of the elements of claim 14. The combination of Kawaguchi, Klein, Nourshargh, and Weber fails to teach or suggest every element of claim 14, and therefore fails to teach every element required by dependent claims 15-17 and 24-26. Claims 14, as amended, recites a combination including "the core layer continuously covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure," and "simultaneously depositing and etching a core layer." As discussed above, Nourshargh fails to teach these elements. Kawaguchi also fails to teach at least these elements.

Kawaguchi teaches a process for fabricating planar optical waveguide devices. Kawaguchi, col. 1, lines 38-45. The process requires placing a photoresist in a prescribed waveguide pattern over a surface of a substrate. *Id.* at col. 5, lines 64-66. Recesses 12a (Figures

7a-7e) are formed in the substrate using an etching process. *Id.* at col. 5, line 66- col. 6, line 2. A core layer 14' is subsequently formed on the substrate and in the recesses. *Id.* at col. 6, lines 3-10. The core layer is then patterned, using either polishing or *etching*, such that the core layer 14' *remains only in the recess* 12a, "and the core 14 and the substrate 12 jointly define a planar surface." *Id.* at col. 6, lines 16-20. The process described in Kawaguchi involves a plurality of separate steps, including forming the core layer, doping the core layer, HIPping the assembly, and then, *after* forming the core layer, patterning the core layer. *Id.* at col. 6, lines 6-20.

Kawaguchi thus clearly teaches that the core layer 14' remains only in the recess, and does not "continuously cover[] the ridge portion, the sidewall portion, and the planar portion," and that the core layer 14' is etched in a separate step that is not simultaneous with the deposition step. Accordingly, Kawaguchi fails to teach at least the elements, "the core layer *continuously* covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure," and "*simultaneously* depositing and etching," as recited in amended claims 14 and 29, and required by dependent claims 15-17 and 24-26 (emphasis added).

Klein, cited for teaching "what one of ordinary skill in the art thinks of when one is to sputter glass," fails to cure the deficiencies of Kawaguchi. Klein teaches a general method for sputtering a target using, for example, an RF discharge. Klein, col. 4, lines 3-15. Klein, however, fails to teach or suggest at least the elements, "the core layer continuously covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure," and "simultaneously depositing and etching," as recited in amended claims 14 and 29, and required by dependent claims 15-17 and 24-26.

Nourshargh, as noted above, also fails to teach at least "the core layer continuously covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure," and

“simultaneously depositing and etching,” as recited in amended claims 14 and 29, and required by dependent claims 15-17 and 24-26, and thus fails to cure the above-noted deficiencies of Kawaguchi and Klein.

Weber also fails to cure the above-noted deficiencies of Nourshargh. Weber teaches manufacturing a planar waveguide, wherein “surface of layer 2 is etched,” and “etching produces a thin layer with high fluoride content.” Weber, col. 2, lines 45-49. Weber further teaches that a “silicon oxide core layer 3 is deposited,” and “this layer 3 remains complete or is structured,” wherein “[s]tructuring of the waveguide can be accomplished ... by reactive ion *etching*.” Weber, col. 2, lines 55-58 (emphasis added).

Weber specifically teaches depositing core layer 3 on thin planar fluoride layer 4, and is silent as to a ridge structure. Weber thus fails to teach or suggest “the core layer continuously covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure,” as recited in amended claims 14 and 29, and required by dependent claims 15-17 and 24-26. Weber further explicitly teaches etching core layer 3 after depositing core layer 3, and thus also fails to teach or suggest a process “*simultaneously* depositing and etching a core layer,” as also recited in amended claims 14 and 29, and required by dependent claims 15-17 and 24-26 (emphasis added).

For at least the reason that Kawaguchi in view of Klein, Nourshargh, and Weber fails to teach or suggest every element recited in claims 14 and 29, and required by claims 15-17 and 24-26, a *prima facie* case of obviousness has not been established. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of claims 15-17, 24-26 and 29 under 35 U.S.C. § 103(a).

C. Kawaguchi in view of Klein, and Kestigian

Claim 18, as amended recites a combination including at least the elements, “the core layer continuously covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure,” and “simultaneously depositing and etching a core layer.” Kawaguchi, whether taken alone, or in combination, fails to teach at least this element.

As discussed above, Kawaguchi utilizes a *separate* patterning or etching step to form an integral planar surface between the core layer and the recesses to prevent voids from forming upon deposition of the upper cladding layer, wherein the core layer only remains in the recesses. Kawaguchi, e.g., col. 6, lines 16-20. Klein merely teaches a typical glass sputtering method, as discussed above, and fails to cure the deficiencies of Kawaguchi.

Kestigian further fails to cure the deficiencies of Kawaguchi. Kestigian teaches a method for forming targets for use in ion beam sputtering. Kestigian, abstract. Kestigian’s method involves the formation of targets wherein plugs with different compositions can be inserted into a plurality of holes formed in the target. *Id.* at col. 3, lines 12-25. Kestigian, however, does not teach or suggest the formation of waveguides or core layers. Thus, Kestigian fails to teach or suggest at least the elements, “the core layer continuously covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure,” and “simultaneously depositing and etching a core layer,” as recited in amended claim 18.

Since the references fail to teach or suggest each and every element of claim 18, a *prima facie* case of obviousness has not been established. Accordingly, Applicants respectfully request the rejection of claim 18 under 35 U.S.C. § 103(a) be withdrawn.

Claims 19-20 depend from claim 18, and thus require all of the elements of claim 18. Since Kawaguchi, whether taken alone or in combination with Klein and Kestigian, fails to teach each and every element of claim 18, the references further fail to teach each and every element of



the dependent claims. Thus, a *prima facie* case of obviousness has not been made. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of claims 19-20 under 35 U.S.C. § 103(a).

D. Kawaguchi in view of Klein, Nourshargh, and Makikawa

Claim 27 depends from claim 14, and thus requires all of the elements of claim 14. As discussed above, neither Kawaguchi, nor Klein, nor Nourshargh teach or suggest at least the elements “the core layer continuously covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure,” and “simultaneously depositing and etching a core layer,” as recited in amended claim 14 and required by claim 27. Makikawa fails to cure the above-noted deficiencies of these references.

Makikawa, apparently cited by the Examiner at page 13 of the Office Action for teaching “etch[ing] silicon and then thermally oxidize the silicon and this results in non-deformed substrate,” discloses a method for preparing an optical waveguide substrate. As shown in FIG 1 (c)-(d), Makikawa teaches depositing a core layer 14 in grooves 12, and over oxidized substrate 13. Makikawa further teaches, however, that:

the surface of the resulting structure is abraded off until the substrate is exposed and a flat surface is defined ... [a]brasion is preferably continued until the buried portions of the core film are abrade several microns. This results in the substrate in which the core film segments 14 and the under clad film 13 are present on the same substrate surface. Makikawa, col. 3, lines 34-46.

Accordingly, this cannot constitute a teaching of “the core layer continuously covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure,” and “simultaneously depositing and etching a core layer,” as recited in claim 14 and required by claim 27. Since the references, whether taken alone or in combination, fail to teach or suggest each and every element required by claim 27, the Examiner has failed to establish a *prima facie*

case of obviousness. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of claim 27 under 35 U.S.C. § 103(a).

Because the applied references, taken alone or in combination, fail to teach or suggest every element recited in the claims, a *prima facie* case of obviousness has not been established. Accordingly, Applicants submit that the Examiner's rejection of claims 14-20, 24-27 and 29 under 35 U.S.C. § 103(a) is erroneous, and respectfully request that the rejections under 35 U.S.C. § 103(a) be withdrawn.

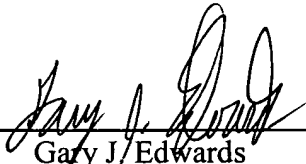
In view of the foregoing remarks, Applicants submit that this claimed invention is neither anticipated nor rendered obvious in view of the prior art references cited against this application, request the Examiner's reconsideration and reexamination of the application, and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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